



## **Gliadin affects glucose homeostasis and intestinal metagenome in C57BL6 mice fed a high-fat diet**

**Zhang, Li; Hansen, Axel Kornerup; Bahl, Martin Iain; Hansen, Camilla Hartmann Friis; Andersen, Daniel; Pedersen, Susanne Brix; Hellgren, Lars; Licht, Tine Rask**

*Publication date:*  
2015

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Zhang, L., Hansen, A. K., Bahl, M. I., Hansen, C. H. F., Andersen, D., Pedersen, S. B., Hellgren, L., & Licht, T. R. (2015). *Gliadin affects glucose homeostasis and intestinal metagenome in C57BL6 mice fed a high-fat diet*. Abstract from Keystone Symposia - Gut Microbiota Modulation of Host Physiology: The Search for Mechanism, Keystone, Colorado, United States.

---

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

## **Gliadin affects glucose homeostasis and intestinal metagenome in C57BL/6 mice fed a high-fat diet**

Zhang, Li<sup>1,3</sup>; Hansen, Axel Kornerup<sup>3</sup>; Bahl, Martin Iain<sup>1</sup>; Hansen, Camilla Hartmann Friis<sup>3</sup>; Andersen, Daniel<sup>2</sup>; Brix, Susanne<sup>2</sup>; Hellgren, Lars I<sup>2</sup>; Licht, Tine Rask<sup>1</sup>

<sup>1</sup>National Food Institute, Technical University of Denmark, Denmark; <sup>2</sup>Department of Systems Biology, Technical University of Denmark, Denmark; <sup>3</sup>Department of Veterinary Disease Biology, University of Copenhagen, Denmark

Dietary gluten and its component gliadin are well-known environmental triggers of celiac disease and important actors in type-1 diabetes, and are reported to induce alterations in the intestinal microbiota. However, research on the impact of gluten on type-2 diabetes in non-celiac subjects is more limited. The aim of this study was to investigate the effect of gliadin on glucose homeostasis and intestinal ecology in the mouse.

Forty male C57BL/6 mice were fed a high-fat diet containing either 4% gliadin or no gliadin for 22 weeks. Gliadin consumption significantly increased the HbA1c level over time, with a borderline significance of higher HOMA-IR (homeostasis model assessment of insulin resistance) after 22 weeks. Sequencing of the V3 region of the bacterial 16S rRNA genes showed that gliadin altered the abundance of 81 bacterial taxa, separating the intestinal microbial profile of the gliadin consuming mice from the control mice in the principal coordinate analysis (PCoA) of weighted UniFrac distance. Moreover, gliadin reduced the ileal gene expression of tight junction protein 1, occludin, cadherin 1, mucin 2 and mucin 3, indicating an impaired intestinal barrier function. No difference was found in body weight gain, feed consumption or circulating cytokines (IL-1 $\beta$ , IL-6, IFN- $\gamma$ , TNF- $\alpha$  and IL-10).

Our study is the first to show that gliadin as part of a defined synthetic feed exacerbates the glycaemia and alters the intestinal microbiota composition. Comprehensive analyses of metabolites, histological sections and the profile of specific immune cells are in progress to elucidate the mechanism behind the observed effects.

This study is funded by the Danish Council for Strategic Research.